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(71) Applicant(s)
Hewlett-Packard Company
(Incorporated in USA - Delaware)
3000 Hanover Street, Palo Alto, California 94304,
United States of America

(72) Inventor(s)
James E Clough

(74) Agent and/or Address for Service
Carpmaels & Ransford
43 Bloomsbury Square, LONDON, WC1A 2RA,
United Kingdom

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G4A AFL

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Online: WPI, EPODOC, PAJ, INSPEC, COMPUTER,
Selected Internet sites

(54) Abstract Title
Upgrading firmware from a web site using an applet

(57) A system and method upgrade a firmware image in a device from firmware images stored at a website. A browser is used to browse to the website. The browser automatically downloads (22) applet code. Either the applet code or a user selects (24) a device for upgrading. The applet code discovers (26) the model and firmware version number of the selected device. The applet code builds (28) a list of available firmware images for the selected device from the firmware images stored at the website. Either the applet or a user selects (30) a firmware image from the list of firmware images for the selected device. The applet code fetches (32) the selected firmware image and stores it locally. The applet code then replaces (34) the current firmware image of the selected device with the selected firmware image.
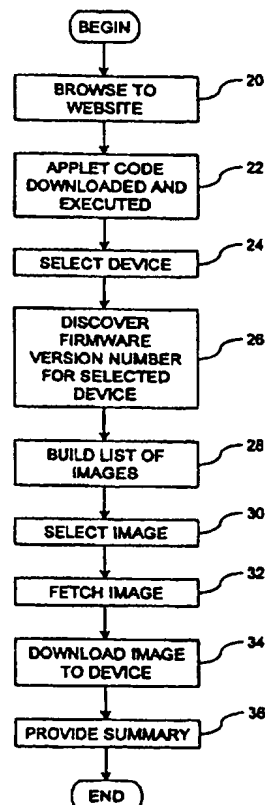
BEGIN

BROWSE TO WEBSITE — 20

APPLET CODE DOWNLOADED AND EXECUTED — 22

SELECT DEVICE — 24

DISCOVER FIRMWARE VERSION NUMBER FOR SELECTED DEVICE — 26

BUILD LIST OF IMAGES — 28

SELECT IMAGE — 30

FETCH IMAGE — 32

DOWNLOAD IMAGE TO DEVICE — 34

PROVIDE SUMMARY — 36

END

FIG. 2

GB 2 348 987 A

FIG. 1

```
        ( BEGIN )
            │
            ▼
    ┌─────────────────┐
    │   BROWSE TO     │──── 20
    │    WEBSITE      │
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │  APPLET CODE    │──── 22
    │ DOWNLOADED AND  │
    │    EXECUTED     │
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │  SELECT DEVICE  │──── 24
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │    DISCOVER     │
    │    FIRMWARE     │──── 26
    │ VERSION NUMBER  │
    │  FOR SELECTED   │
    │     DEVICE      │
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │  BUILD LIST OF  │──── 28
    │     IMAGES      │
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │  SELECT IMAGE   │──── 30
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │   FETCH IMAGE   │──── 32
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │ DOWNLOAD IMAGE  │──── 34
    │   TO DEVICE     │
    └─────────────────┘
            │
            ▼
    ┌─────────────────┐
    │ PROVIDE SUMMARY │──── 36
    └─────────────────┘
            │
            ▼
         ( END )
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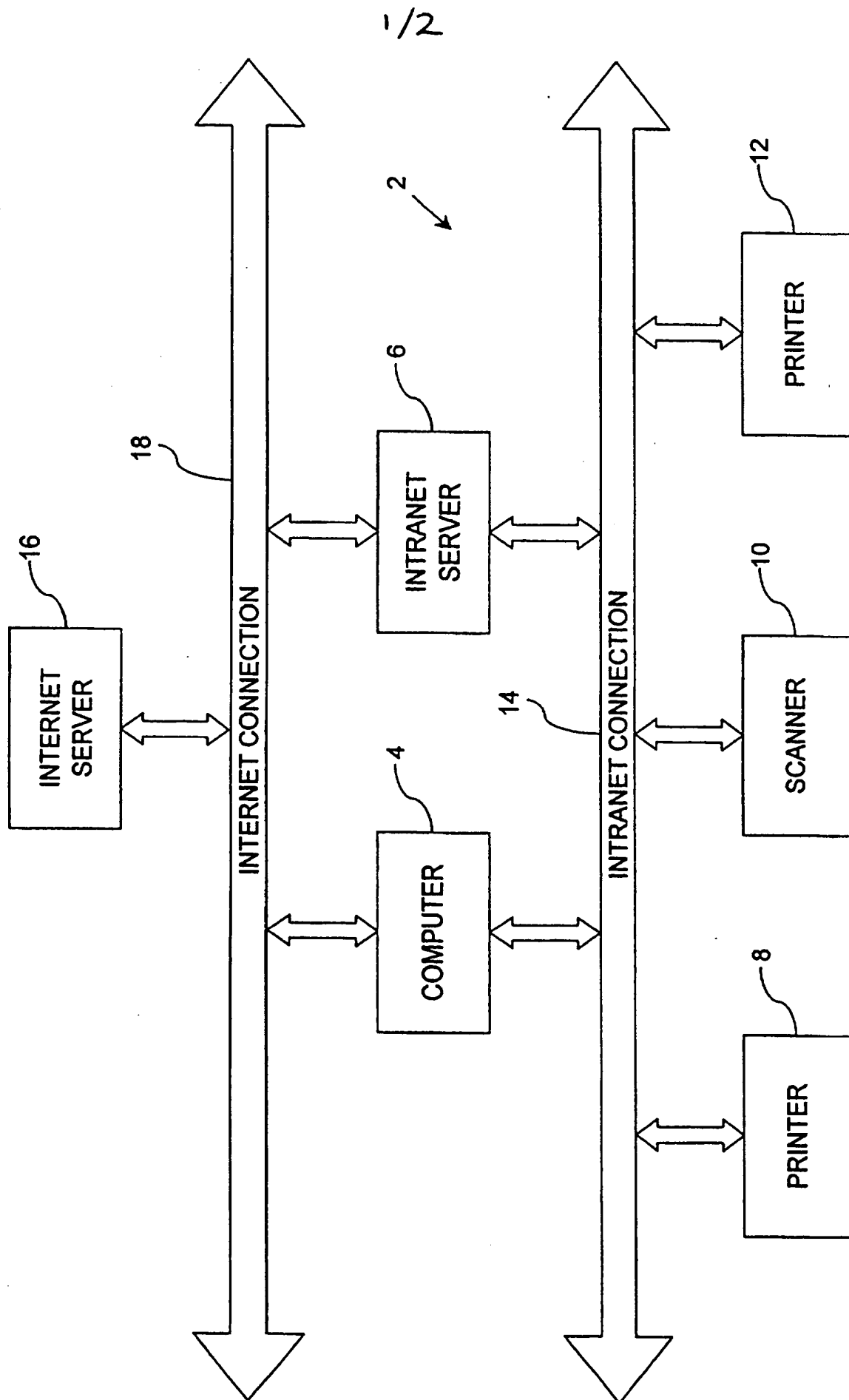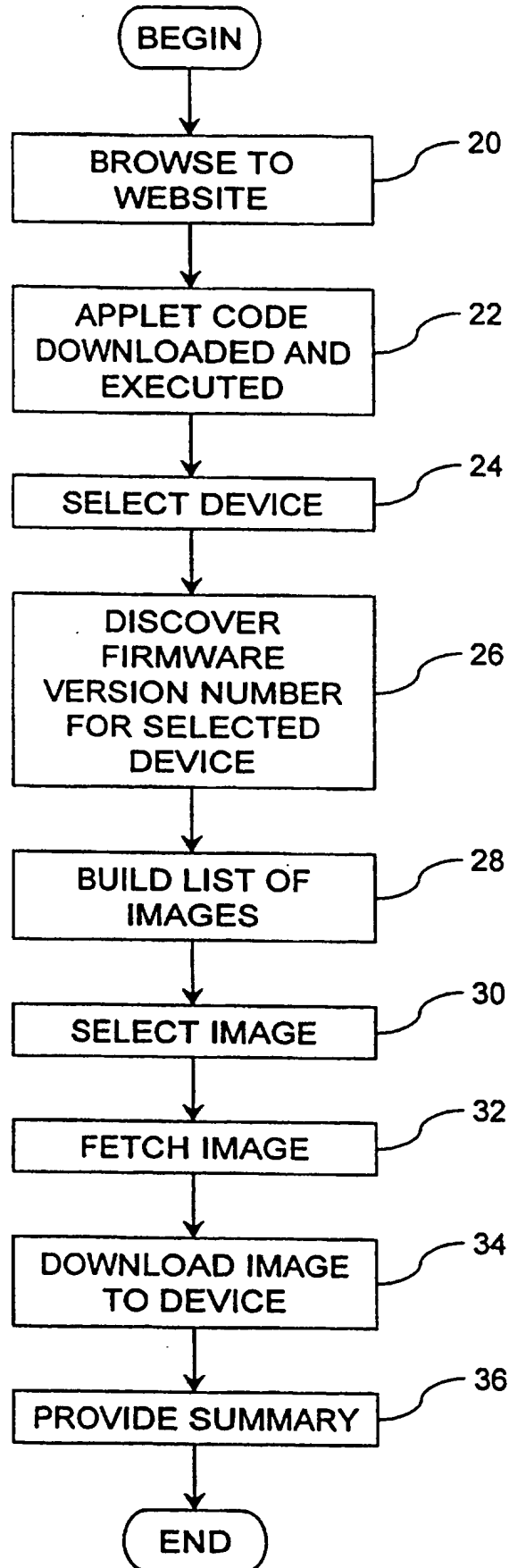
FIG. 2

## ZERO-INSTALL INTERNET FIRMWARE DOWNLOAD

### FIELD OF THE INVENTION

This invention relates in general to firmware technology and, more particularly, to a system and method for updating firmware from a website.

### BACKGROUND OF THE INVENTION

Most network-connected devices are controlled by microprocessors that execute firmware stored in non-volatile memory. This firmware is under continuous development for new devices to add new features and eliminate defects. Thus, it is

5  often desirable to upgrade the firmware in an existing device to take advantage of the new features and eliminate the defects.

For many network devices, the firmware in the device may be replaced over a network. A computer communicating with the network executes a download tool that downloads a new firmware image into the network device.

10  A network administrator must obtain the download tool and install it on the computer. In addition, the administrator must determine which firmware images are required to support the set of devices to be upgraded and must obtain those images. Frequently, the new firmware images may be obtained from an internet website. Once the images are obtained, they must then be installed into the download tool.

15  The images may then be downloaded into the devices, replacing the existing firmware with the new firmware images.

The administrator is also responsible for maintaining the set of images available for download. As new firmware images become available, the administrator must obtain the new images and install them into the tool.

## SUMMARY OF THE INVENTION

According to principles of the present invention, a system and method upgrade a firmware image in a device from firmware images stored at a website. A browser is used to browse to the website. The browser automatically downloads

5  applet code. Either the applet code or a user selects a device for upgrading. The applet code determines the model and firmware version number of the selected device. The applet code builds a list of available firmware images for the selected device from the firmware images stored at the website. Either the applet or a user selects a firmware image from the list of firmware images for the selected device.

10  The applet code fetches the selected firmware image and stores it locally. The applet code then replaces the current firmware image of the selected device with the selected firmware image.

Other objects, advantages, and capabilities of the present invention will become more apparent as the description proceeds.

## DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating typical network connections upon which the present invention may operate

Figure 2 is flow chart showing one embodiment of the present invention

5  method.

## DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a typical intranet system 2. A computer 4 communicates with an intranet server 6 and network devices 8, 10, 12 through an intranet connection

10  14. Network devices 8, 10, 12 may be any network devices capable of communicating through a network connection. For example, network device 8 may be a printer, network device 10 may be a scanner, and network device 12 may be another printer.

Computer 4 also may communicate with internet server 16 through internet connection 18. In addition, intranet server 6 may communicate with internet server 16 through internet connection 18. It is desirable, but not necessary, for at least one of computer 4 and intranet server 6 to communicate with internet server 16.

5      Firmware images may either be stored at a website on intranet server 6 or internet server 16. If the firmware images are stored on intranet server 6, the firmware images may have previously been retrieved from internet server 16 through internet connection 18.

Figure 2 is a flow chart illustrating the method of the present invention. An
10     administrator or a user operates a browser on computer 4 to browse 20 to the website where the firmware images are located. For clarity, both administrator and user will be referred to as user. If the website is on internet server 16, the user may either connect to internet server 16 through computer 4 or intranet server 16.

Any conventional browser may be used to browse to the website as long as
15     the browser supports applet code. For the purpose of clarity, applet code is any code that allows the website some control over the computer.

The browser downloads and then executes 22 a firmware download applet. Before continuing, the firmware download applet may first cause the browser to ask permission to access the local network. If permission is not granted, the applet
20     terminates. If permission is granted, the applet continues.

A device is selected 24 for the firmware upgrade. The device may be any network device such as printer 8, scanner 10, or printer 12. The device may be selected either by the user or by the applet code. If the user selects the device, the user may input the name or address of the device or select the device from a list. If
25     the applet code selects the device, the applet code may search the intranet system 2 to discover network devices 8, 10, 12 that have firmware upgradable by the website. Optionally, the applet code may attempt communication with all network devices 8, 10, 12 to discover which are candidates for upgrade. The applet code may use a

network management protocol, such as simple network management protocol (SNMP), for this communication.

Once the device is selected, the applet code communicates with the selected device to discover or ascertain 26 the model and firmware version number of the

5    device. Using the model and firmware version number, the applet code builds 28 a list of firmware images available for upgrading the selected device. Next, either the user or the applet code selects 30 a firmware image to use for upgrading the selected device. The applet code selects the best firmware image for upgrading the selected device. Optionally, the applet code may then allow the user to select from

10   the list of firmware images. The user may then select a firmware image from the list of images or accept the firmware image selected by the applet code.

Next, the applet code fetches 32 the selected firmware image from the website. Preferably, the applet code is then stored temporarily on computer 4. After fetching 32 the selected firmware image, the applet code downloads 34 the selected

15   firmware image to the selected device. Optionally, the applet code then provides 36 a summary to the user.

In one embodiment of the present invention, the applet code downloads a firmware image to one device at a time. If network devices are identical, such as if printer 8 and printer 12 were the same model, the applet code alternatively

20   downloads the firmware image to the identical devices simultaneously.

The present invention system and method allow the firmware of network device to be easily upgraded using a web browser. No special software is needed for the firmware installation other than a standard web browser. Additionally, since images are fetched from a website, no images need be stored or managed by a

25   user. Since the firmware images are available through the internet, firmware images may be updated immediately when they are released by the vendor or manufacturer.

It should be understood that the foregoing description is only illustrative of the invention. Various alternatives and modifications can be devised by those skilled in

the art without departing from the invention. Accordingly, the present invention is intended to embrace all such alternatives, modifications and variances that fall within the scope of the appended claims.

## CLAIMS

What is claimed is:

1   1.   A method for upgrading a firmware image in a device from firmware
2   images stored at a website, the method comprising:
3         (a)   using a browser to browse to the website;
4         (b)   the browser downloading (22) applet code;
5         (c)   the browser executing the applet code;
6         (d)   selecting (24) the device with the firmware image to be
7   upgraded;
8         (e)   selecting (30) one of the firmware images from the firmware
9   images stored at the website; and,
10        (f)   the applet code replacing (34) a current firmware image of the
11  selected device with the selected firmware image.

1   2.   The method of claim 1 further including before selecting (30) one of
2   the firmware images, ascertaining (26) a version number of the current firmware
3   image of the selected device.

1   3.   The method of claim 1 wherein selecting (30) one of the firmware
2   images includes the applet code selecting a best firmware image for the selected
3   device.

1   4.   The method of claim 1 wherein selecting (30) one of the firmware
2   images includes:
3         (a)   the applet code building (28) a list of available images for the
4   selected device from the firmware images stored at a website; and,

5          (b)     a user selecting one of the firmware images from the list of

6  firmware images.

1      5.     The method of claim 1 wherein the applet code replacing (34) the

2  current firmware image includes:

3          (a)     the applet code fetching (32) the selected firmware image from

4  the website; and,

5          (b)     the applet code downloading the selected firmware image to

6  the selected device.

1      6.     A system for upgrading a firmware image in a device from firmware

2  images stored at a website, the system comprising:

3          (a)     browser means for browsing to the website;

4          (b)     browser means for downloading (22) applet code;

5          (c)     means for executing the applet code;

6          (d)     means for selecting (24) the device with the firmware image to

7  be upgraded;

8          (e)     means for selecting (30) one of the firmware images from the

9  firmware images stored at the website; and,

10        (f)     applet code means for replacing (34) a current firmware image

11  of the selected device with the selected firmware image.

1      7.     The system of claim 6 further including means for ascertaining (26) a

2  version number of the current firmware image of the selected device.

1      8.     The system of claim 6 wherein the means for selecting (30) one of the

2  firmware images includes applet code means for selecting a best firmware image for

3  the selected device.

1     9.    The system of claim 6 wherein the means for selecting (30) one of the

2  firmware images includes:

3        (a)    applet code means for building (28) a list of available images

4  for the selected device from the firmware images stored at a website; and,

5        (b)    means for a user selecting one of the firmware images from the

6  list of firmware images.


1     10.    The system of claim 6 wherein the applet code means for replacing

2  (34) the current firmware image includes:

3        (a)    applet code means for fetching (32) the selected firmware

4  image from the website; and,

5        (b)    applet code means for downloading the selected firmware

6  image to the selected device.

7

| Application No: | GB 9928413.5 | Examiner: | Ben Micklewright |
|---|---|---|---|
| Claims searched: | 1-10 | Date of search: | 11 August 2000 |

## Patents Act 1977
## Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

    UK Cl (Ed.R):  G4A (AFL)

    Int Cl (Ed.7):  G06F (9/445)

Other:    Online: WPI, EPODOC, PAJ, INSPEC, COMPUTER, Selected Internet sites

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | Relevant to claims |
|---|---|---|
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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
| & | Member of the same patent family | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |